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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/896,085	06/29/2001	David Thomas Neilson	8-4	9501

7590

08/06/2003

Docket Administrator (Room 3J-219)
Lucent Technologies Inc.
101 Crawfords Corner Rd.
Holmdel, NJ 07733-3030

EXAMINER

WOOD, KEVIN S

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 08/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

09/896,085

Applicant(s)

NEILSON ET AL.

Examiner

Kevin S Wood

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20, 22-24 and 27-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 and 12 is/are allowed.
- 6) ☒ Claim(s) 1-10, 13-20, 22-24 and 27-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2001 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: *Brian Healy*

Response to Amendment

1. This action is responsive to RCE filed 7/2//03 requesting amendment B (filed 5/27/03) be entered and considered by the examiner. Claims 1, 27 and 32 are now amended. No claims have been canceled and no new claims have been added. Claims 1-20, 22-24 and 27-32 are pending in the claim.

Response to Arguments

2. Applicant's arguments filed in amendment B on 7/2/03 have been fully considered but they are not persuasive. The examiner has thoroughly reviewed the applicant's arguments and firmly believes the cited reference to reasonably and properly meet the claimed limitations.

The applicant's primary argument is that U.S. Patent No. 6,330,102 to Daneman et al. does not disclose all the limitations of the amended claims. Specifically, the applicant argues that Daneman et al. does not disclose the first and second angles of reflection combine in the same direction so that the combined angle is greater than either the first or second angle about the specified axis. The examiner respectfully disagrees with this argument.

The applicant goes on to argue that Daneman et al. teaches that the mirror of the various MEMS devices that are optically coupled together rotate about mutually orthogonal axes. Thus, the angles of rotation in the coupled MEMS device of Daneman et al. do not combine in the same direction so that the combined angle is greater than either of the first or second angle about a specified axis.

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It is clear that the Daneman et al. reference provides multiple MEMS devices, where each has a plurality of mirrors, each of these mirrors being able to rotate about at a single axis. It is also clear that the system of Fig. 4, having two MEMS devices, each containing a plurality of mirrors capable of rotating about a single axis, would be capable of producing a combined angle of reflection greater than either the first or second angle of reflection about a specified axis.

3. The allowance of claim 19 is withdrawn. The examiner has reviewed the prior art and believes the prior art to teach all the limitations of this claim. The examiner regrets any inconvenience that this may have caused.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1-8, 13, 15-20, 22-24, 27 and 30-32 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,330,102 to Daneman et al.

Referring to claim 1, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses an optical switch including: a first MEMS device

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(212) containing a first number of micro mirrors (213); a second MEMS device (224) containing a second number of micro mirrors (225); and a first imaging system (216) optically coupled to the first MEMS device so as to produce an image of each of the micro mirrors of the first MEMS device on a corresponding micro mirror of the second MEMS device; where at least one of the micro mirrors of the first MEMS device is grouped with at least one of the micro mirrors of the second MEMS devices such that the angle of reflection from the first mirror and the second mirror combine to produce an overall effective angle. See Fig. 4 and the respective portion of the specification. Daneman et al. also clearly shows that neither of the angle of reflection from the at least one grouped micro mirror of the first MEMS device and the angle of reflection from the at least one grouped micro mirror of the second MEMS device is zero. See Fig. 4.

Referring to claim 2, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses that the first MEMS device (212) and the second MEMS device (224) have the same number of mirrors. Daneman et al. show each MEMS device containing nine mirrors in Fig. 4.

Referring to claim 3, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses a plurality of optical sources (202) coupled to supply input light to the first MEMS device. See Fig. 4.

Referring to claim 4, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses a plurality of optical sources (202) coupled to supply input light to the first MEMS device, where the optical sources are an optical fiber array. See Fig. 4.

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Referring to claim 5, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses a receiver (204) coupled to receive output light from the second MEMS device. See Fig. 4.

Referring to claim 6, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses a receiver (204) coupled to receive output light from the second MEMS device, where the receiver is an array of optical fibers. See Fig. 4.

Referring to claim 7, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses that the first imaging system reproduces an angle of reflection of the light from each of the micro mirrors of the first MEMS device. See Fig. 3 and the respective portion of the specification.

Referring to claim 8, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses that the overall angle of reflection for the coupled mirrors is the sum of the reflection angles of each of the coupled mirrors.

Referring to claim 13, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses that the number of mirrors in the first MEMS device (212) is the same as the number of mirrors in the second MEMS device (224). Each device includes nine mirrors in Fig. 4.

Referring to claim 15, Daneman et al. discloses all of the limitations of the claimed invention. It is inherent within the switch disclosed by Daneman et al. that the micro mirrors of the first device may be the same size as the micro mirrors of the second device.

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Referring to claim 16, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses that the mirror sizes may be altered without changing the scope of the invention. See col. 4, lines 48-55. Therefore, it is inherent that the mirror sizes may be adjusted as needed.

Referring to claim 17, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses an imaging system that is a telecentric system.

Referring to claim 18, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses a switching device containing: a third MEMS device (222) containing a third number of micro mirrors (223); a fourth MEMS device (214) containing a fourth number of micro mirrors (215); and a second imaging system (226) optically coupled to the third MEMS device so as to produce an image of each of the micro mirrors of the third MEMS device on a corresponding micro mirror of the fourth MEMS device; where at least one of the micro mirrors of the third MEMS device is grouped with at least one of the micro mirrors of the fourth MEMS device such that the angles of reflection from the mirrors combine to produce an overall effective angle. See Fig. 4 and the respective portion of the specification.

Referring to claim 19, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses an optical switch including: a first MEMS device (212) containing a first number of micro mirrors (213); a second MEMS device (224) containing a second number of micro mirrors (225); and a first imaging system (216) optically coupled to the first MEMS device so as to produce an image of each of

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the micro mirrors of the first MEMS device on a corresponding micro mirror of the second MEMS device; where at least one of the micro mirrors of the first MEMS device is grouped with at least one of the micro mirrors of the second MEMS devices such that the angle of reflection from the first mirror and the second mirror combine to produce an overall effective angle. Daneman et al. also discloses a third MEMS device (212) containing a third number of micro mirrors, wherein light reflected by the micro mirrors of the third MEMS device is coupled to the first MEMS device (214).

Referring to claim 20, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses a third MEMS device (222) where the light reflected by the second MEMS device (214) is coupled to the third MEMS device. It is inherent that if the switch of Daneman et al. were operated as a bi-directional switch, then the light reflected by the second MEMS device would be coupled to the third MEMS device.

Referring to claim 22, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses the first MEMS arranged to act as a booster.

Referring to claim 23, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses a device where the grouped mirrors may contribute different reflection angles to the overall reflection angle of the system.

Referring to claim 24, Daneman et al. discloses all of the limitations of the claimed invention. It is inherent within the disclosed switch that one micro mirror within each group may be used for fine control, while the other is used for coarse tilt. Each

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mirror of the MEMS devices can be individually controlled. Therefore, the user can control the adjustment of the mirrors as desired.

Referring to claim 27, Daneman et al. discloses all of the limitations of the claimed method. Daneman et al. discloses a method for operating an optical switch including a first MEMS device (212) containing a first number of micro mirrors (213), a second MEMS 214) device containing a second number of micro mirrors (215), the method comprising the step of: imaging the first MEMS device onto the second MEMS device so that the angle of reflection from at least one micro mirror of the first MEMS device and the angle of reflection from at least one micro mirror of the second MEMS device combine to produce an overall effective angle. See Fig. 3 and Fig. 4, along with their respective portions of the specification. Daneman et al. also clearly shows that neither of the angle of reflection from the at least one grouped micro mirror of the first MEMS device and the angle of reflection from the at least one grouped micro mirror of the second MEMS device is zero. See Fig. 4.

Referring to claim 30, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses light passes from fiber (203) and is received by the first MEMS device (212).

Referring to claim 31, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses the coupling of light from the second MEMS device to a fiber (205).

Referring to claim 32, Daneman et al. discloses all of the limitations of the claimed invention. Daneman et al. discloses an optical switch including: a first micro

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reflective means (213) mounted on a first MEMS device (212); a second micro reflective means (215) mounted on a second MEMS device (214); and a first imaging means (216) optically arranged to produce an image of the first micro reflective means at the second micro reflective means such that the angle of reflection of the first micro reflective means and the angle of reflection from the second micro reflective means combine to produce an overall effective reflective angle. See Fig. 4 and the respective portion of the specification. Daneman et al. also clearly shows that neither of the angle of reflection from the at least one grouped micro mirror of the first MEMS device and the angle of reflection from the at least one grouped micro mirror of the second MEMS device is zero. See Fig. 4.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 9, 10, 14, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,330,102 to Daneman et al.

Referring to claims 9 and 28, Daneman et al. discloses all of the limitations of the claimed invention except Daneman et al. does not teach the use of a field lens for receiving the light reflected by the second MEMS device. However, Daneman et al. discloses that it is known within the prior art to provide a lens for receiving the light reflected by the second MEMS device prior to the light entering the optical fibers. See Fig. 2. It would have been obvious to one of ordinary skill in the art at the time of invention to include a lens for receiving the light reflected by the second MEMS device for the purpose of focusing the light into an optical fiber.

Referring to claims 10 and 29, Daneman et al. discloses all of the limitations of the claimed invention except Daneman et al. does not teach the use of a field lens passing light before being incident onto the first MEMS device. However, Daneman et al. discloses that it is known within the prior art to provide a lens for coupling the light from an optical fiber onto the first MEMS device. See Fig. 2. It would have been obvious to one of ordinary skill in the art at the time of invention to include a lens to pass light to the first MEMS device for the purpose of efficiently coupling the light from an optical fiber onto a mirror located in the first MEMS device.

Referring to claim 14, Daneman et al. discloses all of the limitations of the claimed invention except Daneman et al. doesn't disclose that the number of micro

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mirrors in the first MEMS device may be different from the number of micro mirrors in the second MEMS device. It is known in the art that reducing the number of micro mirrors in an MEMS switch will reduce the capacity of the switch and also reduce the cost of the switch. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have less micro mirrors on one of the MEMS devices than another for limiting the capacity of the switching device and reducing the cost of the device.

Allowable Subject Matter

9. Claims 11 and 12 are allowed.

10. The following is a statement of reasons for the indication of allowable subject matter:

Referring to claims 11 and 12, the prior art does not include all of the limitations of the claimed invention. The prior art fails to disclose a mirror for receiving light reflected by the second MEMS device and reflecting the light back toward the second MEMS device.

Conclusion


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin S Wood whose telephone number is (703) 605-5296. The examiner can normally be reached on Monday-Thursday (7am - 5:30 pm).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B Bovernick can be reached on (703) 308-4819. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 307-0956.

KSW
July 31, 2003


Brian Healy
Primary Examiner